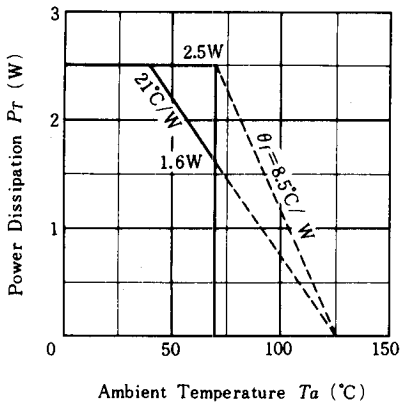
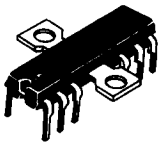
HA1329

2.5W AUDIO POWER AMPLIFIER WITH OUTPUT TRANS.

■ MAXIMUM POWER DISSIPATION CURVE

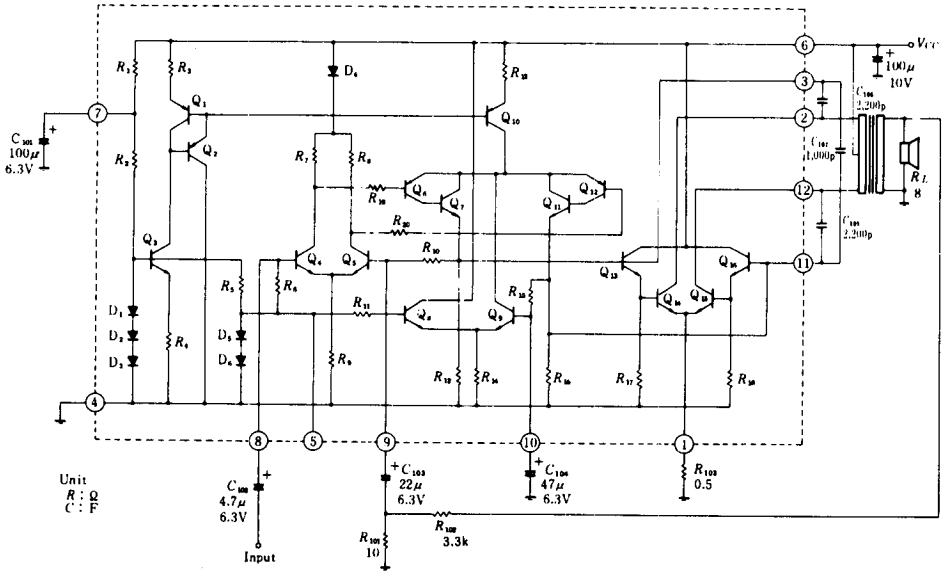




(DP-12T)

Notes:
1. θ_f: Thermal Resistance of Heat Sink
2. $\theta_{j\text{-}c}$=13.5° C/W
3. Maximum Power Dissipation is 1.6W at V_{CC}=6V, 2.5W at 7.5V and 3.6W at 9V. (when R_L=8Ω, f=1kHz sine wave input).
4. Use within a solid line.

■ CIRCUIT SCHEMATIC & TYPICAL EXTERNAL PARTS



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C, R_L=8Ω)

Item	Symbol	Rating	Unit	Note
Supply Voltage	V_{CC}	9	V	1
Peak Output Current	$I_{O\,(peak)}$	1.4	A	2
Power Dissipation	P_T	2.5	W	3
Junction Temperature	T_j	125	°C	
Operating Temperature	T_{opr}	−20 to +70	°C	4
Storage Temperature	T_{stg}	−55 to +125	°C	

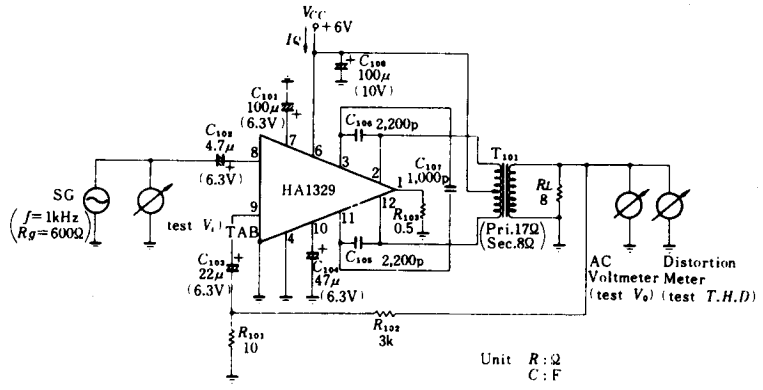
Notes: 1. Standard operating voltage is 6V.
2. Max. collector current of power transistor when usual operating condition.
3. Value at T_c=70°C (IC Tab Temperature)
4. Value when attached to heat sink plate (θ_f=21°C/W) at P_T=1.6W

■ ELECTRICAL CHARACTERISTICS (V_{CC}=6V, f=1kHz, R_g=600Ω, R_L=8Ω, Ta=25°C)

Item	Symbol	Test Condition	min	typ	max	Unit
Quiescent Current	I_Q		—	27.5	55	mA
Voltage Gain	G_V		—	49	—	dB
Output Power	P_{out}	T.H.D=10%	1.8	2.5	—	W
Total Harmonic Distortion	T.H.D	P_{out}=0.1W	—	0.5	2.0	%
Output Noise Voltage	V_n	R_g=0Ω	—	0.38	1.5	mV
Input Resistance	R_{in}		—	10	—	kΩ
Hum Rejection*	HR	f=100Hz, R_g=0Ω	—	50	—	dB

*Connect to AC voltage (f=100Hz, v=−10dBm, R_g≦27Ω) in series the V_{CC}

■ TEST CIRCUIT



Notes:
1. External Resistance Accuracy:±1%
2. External Capacitance Accuracy:±10%
3. AC Voltmeter Accuracy: ±1%
   It is an average response volmeter

■ NOTES ON EXTERNAL PARTS

● Resistors

R_{101} and R_{102} are resistors used to determine voltage gain. It is possible to select an arbitrary voltage gain by varying the ratio of R_{102}/R_{101}. However, when this ratio is made greater than the recommended value, it produces degrading effects on the distortion factor, hum rejection ratio, and signal-to-noise ratio; and when this ratio is made smaller than the recommended value, there is a risk of oscillation due to excessive feedback; thus, variation of this ratio may exert an ill effect to a large extent. Also, when R_{101} is made greater with the ratio of R_{102}/R_{101} left unchanged, feedback occurs inside the IC to decrease release voltage gain, thus producing impairing effects on characteristics.

R_{103} is a current limiter resistor for a power transistor. Exercise care never to make R_{103} less than 0.47Ω.

● Capacitor

C_{101} is a capacitor used to remove supply ripple voltage. A withstand voltage of 6.3V is sufficient, since terminal voltage on pin 7 will not exceed 6V.

C_{102} is used for input coupling.

C_{103} is a capacitor for AC feedback. When this capacitance is made smaller than the rated value, it produces impairing effects on distortion in the low-frequency area; if this capacitance is made greater, a louder "popping" noise is produced when the power is turned ON.

C_{104} is used as an AC filter of a DC feedback amplifier. To increase this capacitance results in extension of the period of time from turning ON the power to arrival at a steady bias. To decrease this capacitance causes feedback to occur in the low frequency ares, decreasing the gain; thus, impairing effects are produced on the distortion factor and so on.

C_{105} through C_{107} are phase compensator capacitors.

● Transformers

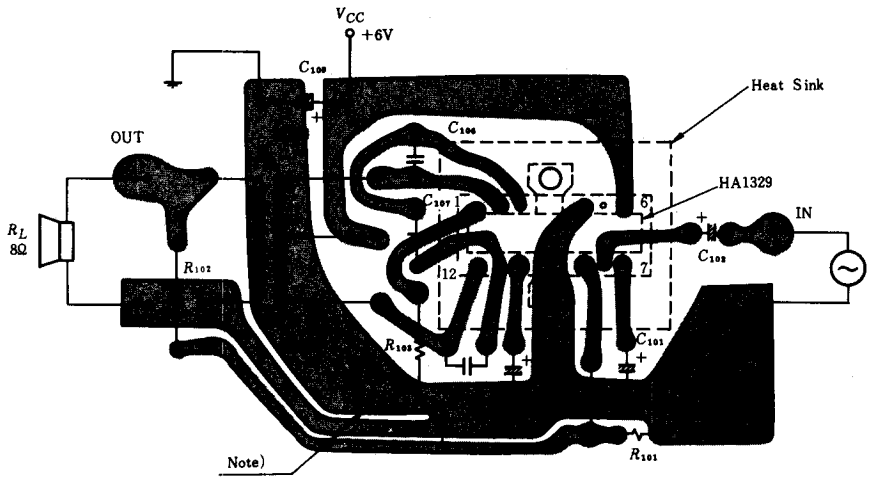
Recommended specifications for output transformer are as follows:

- ○ Impedance : Primary 17Ω, secondary 8Ω at 1 kHz and 1V.
- ○ Max. DC resistance : Primary 1.5Ω, secondary 0.75Ω
- ○ Winding balance : 35dB or above
- ○ Core form : EI-28

■ PRECAUTIONS ON OPERATION

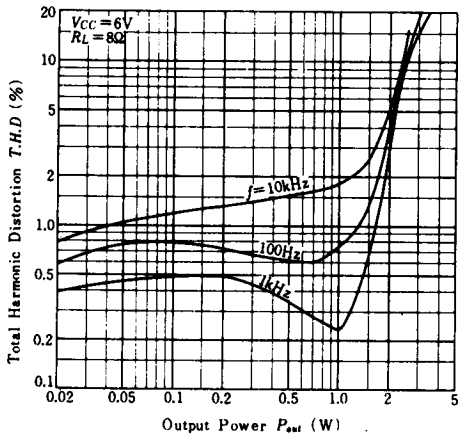
1) Maximum ratings: Maximum ratings must not be exceeded. Operating at the above rating will result in an extreme increase of breakdown and IC failure rate.
2) Breakdown due to short circuit across pins: When the power is turned ON with pins on the IC remaining short-circuited, there is a possibility of breakdown or degradation of the IC. Regarding this IC, exercise the utmost care to prevent the high-potential, low-impedance terminal pins 2 , 6 , and 12 from being short-circuited to pins 3 , 5 and 11 .
3) Breakdown due to load short circuit: When the state of load short circuit continues for an extended period, breakdown of the IC will result. Also, a repetition of load short circuit will cause degradation to the IC.Exercise care !
4) Grounding: The GND pin 4 and the TAB printed circuit board should be securely grounded. Incomplete grounding will cause abnormal operation. Exercise care that the resistance measured across pin 4 and TAB is held to within 10mΩ.
5) IC arrangement: When an IC is used a radio power amplifier, there is a possibility that harmonic radiation will cause abnormal operation of the set. Exercise care to use an IC at a place as far as way from the antenna as possible.
6) Print pattern: The print pattern should conform to the recommended pattern. An inadquate print pattern may result in abnormal operation such as oscillation. .
7) External parts: Use standard external parts as a rule.
8) Upper limit of load impedance: Excessive increase of load impedance may result in oscillation. Exercise care that load impedance is held to within 100Ω.
9) Popping noise: When an increase in signal source resistance causes an irritating "popping" noise to be produced, insert a capacitance of 47μF (6.3V) between the pin 5 and the ground to suppress the noise.

■ PRINTED CIRCUIT BOARD (Bottom View)

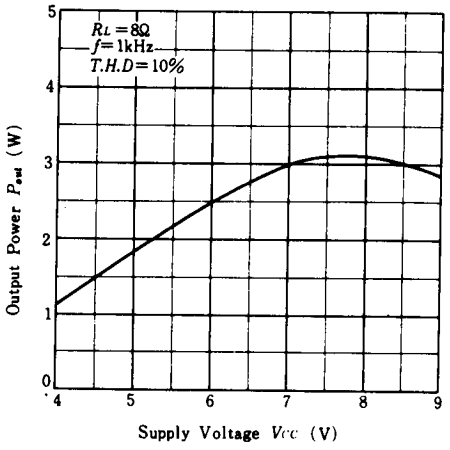


Note: The notch of ground line prevents the distortion from growing worse at flowed full-wave rectification current from the R_{103}.

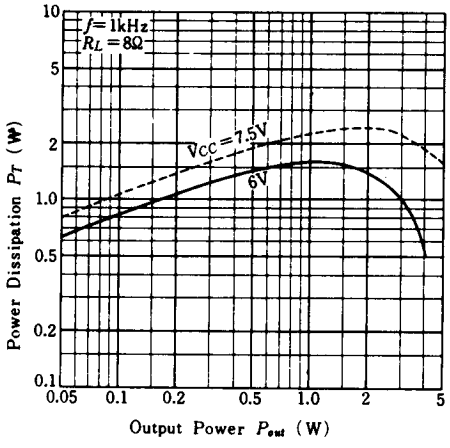
TOTAL HARMONIC DISTORTION VS. OUTPUT POWER



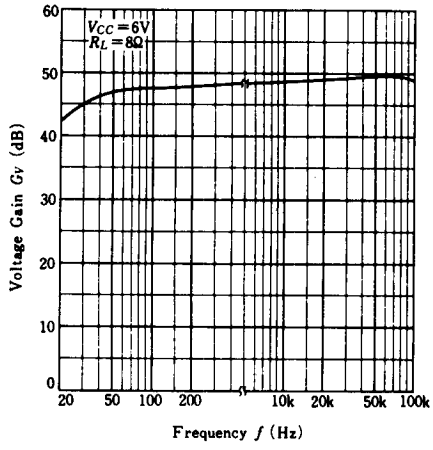
OUTPUT POWER VS. SUPPLY VOLTAGE



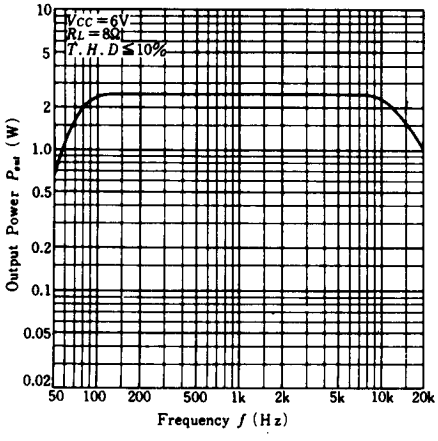
POWER DISSIPATION VS. OUTPUT POWER



VOLTAGE GAIN VS. FREQUENCY



OUTPUT POWER VS. FREQUENCY



TOTAL HARMONIC DISTORTION VS. FREQUENCY